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Comparison of physical and histological properties of crosslinked HA-based viscosupplements: Hylastan SGL-80 and Durolane

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Purpose: In this series of studies we have compared the physical properties and biological reactivity of two crosslinked hyaluronic acid (HA)-based viscosupplements, Durolane (NASHA) and hylastan SGL-80.
Methods and Materials: The rheology of the materials were assessed by a control stress rheometer. The dilution tolerance of the viscosupplements was determined by evaluating the rheological properties at various dilutions. The percent dilution at which the phase angle increased to 50% of its original value was defined as the dilution durability. The biological reactivity of each material was evaluated in a rabbit muscle implant model at 1, 4, and 12 weeks after implantation.
Results: Rheology results suggest that Durolane behaves as a suspension of hard particles in buffer. In contrast, hylastan SGL-80 behaves as a soft and cohesive gel that maintains its physical properties better against dilution. Durolane and hylastan SGL-80 were determined to have dilution durabilities of 25% and 550%, respectively. This suggests that Durolane's viscoelastic properties were not maintained, even at a low level of dilution. In the rabbit muscle implantation study, the materials showed similar tissue reactivity at 1 week post implantation. At 4 and 12 weeks, Durolane showed higher reactivity scores than hylastan SGL-80. Microscopically, Durolane was associated with a cellular infiltrate of lymphocytes and macrophages.
Conclusions: We conclude that hylastan SGL-80 is a softer, smoother gel with superior dilution tolerance and less tissue reactivity than Durolane. As a viscosupplement, hylastan SGL-80 is expected to provide better lubrication, shock absorption (under moderate dilution) and therefore, better physical protection to cartilage than Durolane.

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Weekly intraarticular injections of bone morphogenetic protein-7 inhibit progression of osteoarthritis in rabbit anterior cruciate ligament transected knees

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Purpose: To examine the therapeutic effects of bone morphogenetic protein-7 (BMP-7) in an experimental osteoarthritis model in rabbits.
Methods and Materials: Experimental osteoarthritis was induced in the knee joints of rabbits by bilateral anterior cruciate ligament transection. Rabbits were treated with weekly intraarticular injections of BMP-7. First, 36 knee joints were randomly divided into four groups: 50, 500, 5000 ng BMP-7, and control groups. Following that, to compare results more strictly, paired-matched analysis was performed (n=5). Knees were evaluated macroscopically and histologically at 4, 8, and 12 weeks. Animals were also monitored for any adverse effects of BMP-7.
Results: Histological scores in the 500 and 5000 ng BMP-7 groups were significantly better than those in the others at 12 weeks. Paired-matched analysis showed that both macroscopic and microscopic scores in the 500 ng BMP-7 group were significantly better than those in the control group. Immunohistochemical examination for collagen type X and quantitative micro CT analysis demonstrated that weekly injections of 500 ng BMP-7 did not promote chondrocyte hypertrophy or osteophyte formation.
Conclusions: We demonstrated that weekly intraarticular injections of BMP-7 inhibited osteoarthritis progression in rabbits with anterior cruciate ligament transection. No adverse effects resulting from repeated intraarticular BMP-7 injections were observed.

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Arthroscopic surgery for osteoarthritis of the knee: clinical outcome at 2 and 6 years follow-up.

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Purpose: The role of arthroscopic surgery in arthritic knee remains controversial and unclear. The purpose of this study was to evaluate clinical results after the use of different arthroscopic methods in patients with osteoarthritic knee.
Methods and Materials: We performed an analysis of 131 patients who underwent arthroscopic surgery for treatment of the Kellgren-Lawrence grade 2 and 3 (K-L2, K-L3) knee osteoarthritis. Average patient age was 51 (range: 37-75 years). The outcomes were reported at 2 and 6 years follow-up using the WOMAC and Lysholm scores.
Results: Arthroscopic debridement, lavage and loose body removal carried out in patients with K-L2 at 2 years follow-up resulted in not significant ($p>0.05$) improvement in WOMAC and Lysholm scores. At 6 years follow-up no improvement was reported. In K-L3 group at 2 years follow-up no improvement was noted and at 6 years follow-up we recorded significant deterioration in both scores ($p<0.05$). There was significant ($p<0.05$) deterioration according to WOMAC and Lysholm scores in both groups regardless of follow-up period in cases where microfracture was performed. Forty patients (31 of K-L3 group and 9 of K-L2 group) had further surgeries; 15 had total knee replacement, seven had high tibial osteotomy and five had unicondylar knee arthroplasty.
Conclusions: Our study confirms that inappropriate selection of patients and inappropriate use of certain techniques might increase the number of bad and not-satisfactory results in treatment of the osteoarthritic knees. However, this study supports also the contention that there is a group of patients with mild knee osteoarthritis that might benefit from adequate arthroscopic surgery.

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Adipokines profiles in synovial fluid from patients with osteoarthritis: comparison with serum and identification of articular sources.

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Purpose: As obesity is an important risk factor for osteoarthritis (OA) and is characterized by a low grade of chronic inflammation, we hypothesized that adiposed-derived proteins, i.e. adipokines, may be involved in OA. The present study aims to establish in OA patients the profiles of leptin, adiponectin and resistin in paired serum and synovial fluid (SF) samples, and to identify the articular sources of these adipokines. The relationship between adipokines and TGF-β or IL-6 was also investigated.
Methods and Materials: Levels of adipokines, IL-6 and TGF-β in serum and SF, and in cultured media from joint tissues (synovium, infrapatellar fat pad, meniscus, osteophyte, cartilage and bone) were measured by ELISA.
Results: The adipokines exhibited different patterns of distribution between the joint and the circulating compartment. Serum levels of resistin and adiponectin exceeded those in the paired SF. Conversely, leptin SF concentrations were similar or higher than those measured in serum. Among joint tissues examined, synovium and infrapatellar fat pad were the major sources of adipokines, but osteophytes released also large amounts of leptin. Correlation analysis indicated that IL-6 level was negatively related to the level of free leptin (determined from leptin and its soluble receptor). A positive correlation was found between the levels of TGF-β and adiponectin, and between IL-6 and resistin or adiponectin levels.
Conclusions: In conclusion, articular OA tissues produce adipokines so that circulating levels do not represent the situation in the joint space. Correlation analysis further suggest that adipokines may be involved in both the metabolic changes and the inflammation associated with OA.